

FACT SHEET

The United States Environmental Protection Agency (EPA)
Plans To Reissue A
National Pollutant Discharge Elimination System (NPDES) Permit To:

City of Stites
P. O. Box 300
Stites, Idaho 83552

Permit Number: **ID-002034-6**
Public Notice start date: February 27, 2002
Public Notice expiration date: March 27, 2002

Technical Contact

Name: Madonna Narvaez
Phone: (206) 553-1774
1-800-424-4372 ext. 1774 (within Alaska, Idaho, Oregon, and Washington)
Email: narvaez.madonna@epa.gov

EPA Proposes NPDES Permit Reissuance.

EPA proposes to reissue an NPDES permit to the City of Stites. The draft permit places conditions on the discharge of pollutants from the facility to the South Fork Clearwater River. In order to ensure protection of water quality and human health, the permit places limits on the types and amounts of pollutants that can be discharged.

This Fact Sheet includes:

- information on public comment, public hearing, and appeal procedures
- a map of the location of and a description of the current discharge
- a listing of proposed effluent limitations and other conditions
- detailed technical material supporting the conditions in the permit

The EPA Certification.

Because this facility is located on tribal lands and discharges to tribal waters of the Nez Perce, EPA will certify the NPDES permit for the City of Stites under section 401 of the Clean Water Act.

Public Comment.

Persons wishing to comment on or request a Public Hearing for the draft permit may do so in writing by the expiration date of the Public Notice. A request for a Public Hearing must state the nature of the issues to be raised as well as the requester's name, address and telephone number. All comments and requests for Public Hearings must be in writing and should be submitted to EPA as described in the Public Comments Section of the attached Public Notice.

All written comments and requests should be submitted to the attention of the Director, Office of Water at the following address:

U.S. EPA, Region 10
Re: City of Stites
1200 Sixth Avenue, M/S OW-130
Seattle, Washington 98101

Comments may also be submitted electronically to the technical contact listed above.

After the Public Notice expires, and all comments have been considered, EPA's Director for the Office of Water in Region 10 will make a final decision regarding permit re-issuance. If no significant comments are received, the tentative conditions in the draft permit will become final, and the permit will become effective upon issuance. If comments are received, EPA will address the comments and issue the permit. The permit will become effective 30 days after the issuance date, unless the permit is appealed to the Environmental Appeals Board within 30 days.

Documents are Available for Review.

The draft NPDES permit and related documents can be reviewed or obtained by visiting or contacting EPA's Regional Office in Seattle between 8:30 a.m. and 4:00 p.m., Monday through Friday (See address below). Draft permits, Fact Sheets, and other information can also be found by visiting the Region 10 website at www.epa.gov/r10earth.

United States Environmental Protection Agency
Region 10
1200 Sixth Avenue, OW-130
Seattle, Washington 98101
(206) 553-1774 or
1-800-424-4372 (within Alaska, Idaho, Oregon and Washington)

The Fact Sheet and draft permit are also available at:

EPA Idaho Operations Office
1435 North Orchard Street
Boise, Idaho 83706
(208) 378-5746

TABLE OF CONTENTS

I.	APPLICANT	4
II.	FACILITY INFORMATION	4
	A. Treatment Plant Description	4
	B. Background Information	5
III.	RECEIVING WATER	5
	A. Outfall Location/ Receiving Water	5
	B. Water Quality Standards	5
	C. Water Quality Limited Segment	6
IV.	EFFLUENT LIMITATIONS	6
V.	MUNICIPAL SEWAGE SLUDGE/BIOSOLIDS MANAGEMENT	7
VI.	MONITORING REQUIREMENTS	8
VII.	OTHER PERMIT CONDITIONS	9
	A. Quality Assurance Plan	9
	B. Facility Planning	9
	C. Additional Permit Provisions	9
VIII.	OTHER LEGAL REQUIREMENTS	10
	A. Endangered Species Act	10
	B. Essential Fish Habitat	10
	C. State Certification	10
	D. Permit Expiration	11

APPENDIX A - WATER QUALITY STANDARDS

APPENDIX B - BASIS FOR EFFLUENT LIMITATIONS

APPENDIX C - ENDANGERED SPECIES ACT

APPENDIX D - MAP OF WASTEWATER TREATMENT PLANT LOCATION

I. APPLICANT

City of Stites
NPDES Permit No.: **ID-002034-6**

Facility Mailing Address:
P. O. Box 300
Stites, Idaho 83552

II. FACILITY INFORMATION

A. Treatment Plant Description

The City of Stites owns and operates a municipal treatment plant that provides treatment equivalent to secondary (TES) and disinfection prior to discharge to the South Fork Clearwater River. The plant is designed for an annual average flow of 0.070 million gallons per day (mgd). Recent data show an average daily flow rate of 0.061 mgd and a peak daily flow rate of 0.210 mgd.

The plant collects domestic wastewater from the city through a gravity sewer collection system. Sewage is lifted through a pump station into a lagoon cell where it is treated, then disinfected with chlorine before it is discharged to the South Fork Clearwater River. The city collection system has no combined sewers.

According to the plant operator, design criteria for the City of Stites plant are as follows:

Design Parameters	Design Criteria
Daily average design flow	0.070 mgd
Design BOD ₅ removal	65%
Design TSS removal	65%

A review of the facility's Discharge Monitoring Reports¹ for the past six years indicates permit exceedances as summarized in the table below.

Stites Permit Exceedances, 1995-2000		
Year	Type and Number of Violation	
1995	BOD ₅	1 excursion
	Total Suspended Solids	2 excursions
	Fecal Coliform	8 excursions
	BOD ₅ Percent Removal	5 excursions
1996	Total Suspended Solids	2 excursions

¹ Discharge monitoring reports are forms that the facility uses to report the results of monitoring the facility has done in compliance with its NPDES permit.

Stites Permit Exceedances, 1995-2000		
Year	Type and Number of Violation	
	Fecal Coliform	6 excursions
	BOD ₅ Percent Removal	5 excursions
1997	Total Suspended Solids	3 excursions
	Fecal Coliform	10 excursions
	BOD ₅ Percent Removal	5 excursions
1998	Total Suspended Solids	3 excursions
	Fecal Coliform	5 excursions
	BOD ₅ Percent Removal	1 excursion
1999	Total Suspended Solids	3 excursions
	Fecal Coliform	1 excursions
	BOD ₅ Percent Removal	4 excursions
2000	Total Suspended Solids	2 excursions

B. Background Information

The NPDES permit for this facility expired on January 9, 1991. Under federal law, specifically, the Administrative Procedures Act (APA), a federally issued NPDES permit is administratively extended (i.e., continues in force and effect) provided that the permittee submits a timely and complete application for a new permit prior to the expiration of the current permit. However, since the City did not submit a timely application for a new permit, the current permit was not administratively extended. The City filed a renewal application that was received by EPA on July 31, 2001.

III. RECEIVING WATER

A. Outfall Location/ Receiving Water

The Stites plant discharges to the South Fork Clearwater River at river mile 4. Flow information is available for the South Fork Clearwater River from USGS gauge station 13338500, "SF Clearwater River at Stites ID." Using flow data from the past ten years, the 7Q10 for this station was calculated to be 91.3 cubic feet per second (cfs), and the 1Q10 was 60 cfs.

B. Water Quality Standards

A State's water quality standards are composed of use classifications, numeric and/or narrative water quality criteria, and an anti-degradation policy. The use classification system designates the beneficial uses (such as cold water communities, contact recreation, etc.) that each water body is expected to achieve. The numeric and/or narrative water quality criteria are the criteria deemed necessary, by the State, to support the beneficial use classification of each water body. The anti-degradation policy represents a three tiered approach to maintain and protect various levels of water quality and uses.

The Nez Perce do not have EPA-approved water quality standards. Because State waters are downstream of the discharge off the reservation, EPA evaluated uses and criteria that would protect those waters in lieu of not applying any water quality standards. The *Idaho Water Quality Standards and Wastewater Treatment Requirements* (IDAPA 58.01.02.140.16.) protect the South Fork Clearwater River (C-1, South Fork Clearwater River, Butcher Creek to mouth) for the following beneficial use classifications: cold water communities, salmonid spawning, and primary contact recreation. Additionally, the South Fork Clearwater River is designated a special resource water.

The criteria that the State of Idaho has deemed necessary to protect the beneficial uses for the South Fork Clearwater River, and the State's anti-degradation policy are summarized in Appendix A. The anti-degradation analysis for this facility is also found in Appendix A. Based on the results of this analysis, continued discharge from the Stites facility will not result in a reduction in ambient water quality in the South Fork of the Clearwater River when measured below the mixing zone.

C. Water Quality Limited Segment

A water quality limited segment is any water body, or definable portion of water body, where it is known that water quality does not meet applicable water quality standards, and/or is not expected to meet applicable water quality standards. The South Fork Clearwater River has been listed as water quality limited for sediment and temperature.

Section 303(d) of the Clean Water Act (CWA) requires States to develop a Total Maximum Daily Load (TMDL) management plan for water bodies determined to be water quality limited. A TMDL documents the amount of a pollutant a water body can assimilate without violating a state's water quality standards and allocates that load to known point sources and nonpoint sources. The Idaho Department of Environmental Quality (IDEQ) is scheduled to complete a TMDL for the South Fork Clearwater River in December 2002. The Nez Perce Tribe is party to that agreement.

IV. EFFLUENT LIMITATIONS

In general, the Clean Water Act requires that the effluent limits for a particular pollutant be the more stringent of either technology-based effluent limits or water quality-based limits. A technology based effluent limit requires a minimum level of treatment for municipal point sources based on currently available treatment technologies. A water quality based effluent limit is designed to ensure that the water quality standards of a water body are being met. For more information on deriving technology-based effluent limits and water quality-based effluent limits see Appendix B. The following summarizes the proposed effluent limitations that are in the draft permit.

- A. The pH range must be between 6.5 - 9.0 standard units.
- B. There must be no discharge of floating solids or visible foam other than in trace amounts.
- C. Table 1, below, presents the existing effluent limits for BOD₅ and TSS.

Table 1. Existing BOD ₅ and TSS Limitations		
Parameter	Average Monthly	Average Weekly
BOD ₅ , mg/L (lb/day)	45 (26)	65 (38)
TSS, mg/L (lb/day)	70 (41)	105 (61)

The BOD₅ and TSS mass limits are established based on a facility average annual flow of 0.07 mgd. The mass based limits are calculated from the concentration limit as follows: concentration X design flow X 8.34.

- D. Table 2, below, summarizes the proposed effluent limitations for the City of Stites. The BOD₅ and TSS effluent limits are continued from the previous permit. Technology-based total residual chlorine limits have been included in the permit.

Table 2. Proposed Effluent Limitations			
Parameter	Average Monthly Limit	Average Weekly Limit	Daily Maximum Limit
Flow, mgd	Report	---	Report
Biochemical Oxygen Demand (BOD ₅)	45 mg/L	65 mg/L	---
	26 lb/day	38 lb/day	---
Total Suspended Solids	70 mg/L	105 mg/L	---
	41 lb/day	61 lb/day	---
Total Residual Chlorine	0.5 mg/L	0.75 mg/L	---
	0.29 lb/day	0.44 lb/day	---
BOD Percent removal	85	---	--
TSS Percent Removal	85	---	--
Ammonia (as N), mg/L	Report	---	Report
<i>E. coli</i> bacteria ¹	126/100 mL ²	---	406/100 mL ^{2,3}
¹ Reporting is required within 24 hours if the maximum daily limit is violated. ² A geometric mean of 126 organisms per 100 ml must be based on a minimum of 5 separate samples taken every 3 to 5 days over a thirty day period. ³ This is an instantaneous maximum.			

V. MUNICIPAL SEWAGE SLUDGE/BIOSOLIDS MANAGEMENT

The biosolids conditions in the previous permit were based on best professional judgment since EPA had not promulgated biosolids regulations at the time of permit issuance. Since that time EPA has promulgated regulations for the use and disposal of biosolids.

EPA Region 10 has recently decided to separate the permitting of wastewater discharges and the disposal of biosolids. Under the Clean Water Act, EPA has the authority to issue separate “sludge only” NPDES permits for the purposes of regulating biosolids. EPA has historically implemented the biosolids standards by inclusion of the requirements in facility’s NPDES wastewater permit, the other option authorized by the Act.

EPA will issue a sludge-only permit to this facility at a later date. This will likely be in the form of a general permit through which EPA can cover multiple facilities.

Meanwhile, the environment will be protected since the Permittee’s sludge activities will continue to be subject to the national sewage sludge standards at 40 CFR Part 503. Part 503 contains provisions relating to pollutants in sewage sludge, the reduction of pathogens in sewage sludge, the reduction of the characteristics in sewage sludge that attract vectors, the quality of the exit gas from a sewage sludge incinerator stack, the quality of sewage sludge that is placed in a municipal solid waste landfill unit, the sites where sewage sludge is either land applied or placed for final disposal, and sewage sludge incinerators. The Act prohibits any use or disposal of biosolids not in compliance with these standards. EPA has the authority under the Act to enforce these standards directly, including in the absence of a permit. The Act does not require the facility to have a permit prior to the use or disposal of its biosolids.

VI. MONITORING REQUIREMENTS

Section 308 of the Clean Water Act and federal regulation 40 CFR 122.44(i) require monitoring in permits to determine compliance with effluent limitations. Monitoring may also be required to gather data for future effluent limitations or to monitor effluent impacts on receiving water quality. The Permittee is responsible for conducting the monitoring and for reporting results on Discharge Monitoring Reports to EPA. Table 3, below, presents the proposed effluent monitoring requirements. Table 4 describes the proposed surface water monitoring requirements. Surface water monitoring is required to help gather data for the TMDL that is being developed.

Table 3. Proposed Effluent Monitoring Requirements			
Parameter	Sample Location	Sample Frequency	Sample Type
Flow, mgd	Effluent	Continuous	Recording
Biochemical Oxygen Demand (BOD ₅), mg/L	Influent and Effluent	1 / week	24 hr comp
Total Suspended Solids, mg/L	Influent and Effluent	1 / week	24 hr comp
pH, standard units	Effluent	5 / week	Grab
<i>E. coli</i> bacteria, colonies/100 ml	Effluent	5 / month	Grab
Temperature, degrees C	Effluent	5 / week	Recording
Total Residual Chlorine, mg/L	Effluent	5 / week	Grab
Dissolved Oxygen, mg/L	Effluent	1/quarter	Grab
Ammonia (as N), mg/L	Effluent	1 / quarter	24 hr comp

Table 4. Proposed Surface Water Monitoring Requirements			
Parameter	Units	Sampling Frequency	Sampling Location
Flow	mgd	1 / quarter	Upstream of outfall
BOD ₅	mg/L	1 / quarter	Upstream of outfall
TSS	mg/L	1 / quarter	Upstream of outfall
pH	standard units	1 / quarter	Upstream of outfall
<i>E. coli</i> bacteria	colonies/100 ml	1 / quarter	Upstream of outfall
Temperature	°C	1 / quarter	Upstream of outfall
Dissolved oxygen	mg/L	1/quarter	Upstream of outfall
Ammonia (as N)	mg/L	1 / quarter	Upstream of outfall

VII. OTHER PERMIT CONDITIONS

A. Quality Assurance Plan

The federal regulation at 40 CFR 122.41(e) requires the Permittee to ensure that the monitoring data submitted is accurate and to explain data anomalies if they occur. To accomplish this, the permit requires the Permittee to complete a Quality Assurance Plan within 120 days of the effective date of the final permit and to certify completion of the plan to EPA. The Quality Assurance Plan must consist of standard operating procedures the Permittee must follow for collecting, handling, storing and shipping samples, laboratory analysis, and data reporting.

B. Facility Planning

The permit also requires that the Permittee compute an annual average value for flow, and BOD₅ and TSS loading entering the facility based on the previous 12 months of data or all data available. When the average annual values exceed the 85 percent of the design criteria for the WWTF three months in a row, the Permittee is required to develop a facility plan and schedule within 18 months from the date of the exceedance. This plan or strategy is required to ensure that the Permittee will continue to comply with permit limits if capacity is being exceeded.

C. Additional Permit Provisions

Sections II, III, and IV of the draft permit contain standard regulatory language that must be included in all NPDES permits. Because they are regulations, they cannot be challenged in the context of an NPDES permit action. The standard regulatory language covers requirements such as monitoring, recording, reporting requirements, compliance responsibilities, and other general requirements.

VIII. OTHER LEGAL REQUIREMENTS

A. Endangered Species Act

The Endangered Species Act requires federal agencies to consult with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service if their actions could adversely affect any threatened or endangered species. EPA has determined that issuance of this permit will not affect any of the endangered species that may occur in the vicinity of the discharge.

Reissuance of an NPDES permit for City of Stites discharges will not result in habitat destruction, nor will it result in changes in population that could result in increased habitat destruction for any threatened or endangered species that may occur in the vicinity of the discharge.

B. Essential Fish Habitat

The Magnuson-Stevens Act (January 21, 1999) requires federal agencies to consult with the National Marine Fisheries Service (NMFS) when any activity proposed to be permitted, funded, or undertaken by a federal agency may have an adverse effect on designated Essential Fish Habitat (EFH) as defined by the Act. The EFH regulations define an adverse effect as any impact which reduces quality and/or quantity of EFH and may include direct (e.g. contamination or physical disruption), indirect (e.g. loss of prey, reduction in species' fecundity), site-specific, or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

The EFH species for the area of the discharge include the sockeye, Spring/summer chinook, and Fall chinook salmon; Steelhead, and Bull trout.

For the following reasons, EPA has tentatively determined that issuance of this permit will not affect any EFH in the vicinity of the discharge. The proposed permit has been developed to protect all aquatic life species in the receiving water in accordance with the Idaho water quality standards, including meeting Idaho water quality standards at the edge of the mixing zone. EPA believes that the Idaho water quality criteria for the protection of aquatic life should protect both the managed EFH species and their prey. The effluent is treated wastewater of domestic origin with no significant industrial component. The threats facing these species include habitat degradation, hydropower projects, invasive species, overfishing, and changes in stream temperature. Reissuance of the discharge permit should have no effect on these parameters. In addition, monitoring has shown compliance with Idaho water criteria in the vicinity of the discharge.

EPA will provide NMFS with copies of the draft permit and fact sheet during the public notice period. Any comments received from NMFS regarding EFH will be considered prior to reissuance of this permit.

C. State Certification

Section 401 of the Clean Water Act requires EPA to seek state certification before issuing a final permit. Because this facility is located on tribal lands and discharges to tribal waters of the Nez Perce, EPA will certify in place of the State.

D. Permit Expiration

This permit will expire five years from the effective date of the permit.

APPENDIX A
WATER QUALITY STANDARDS

I. Water Quality Criteria

For the City of Stites discharge, the following water quality criteria are necessary for the protection of the beneficial uses of the South Fork Clearwater River:

- A. IDAPA 58.01.02.200.02 - Surface waters of the State shall be free from toxic substances in concentrations that impair designated beneficial uses. Furthermore, IDAPA 58.01.02.210.01 incorporates the National Toxics Rule by reference as found in 40 CFR 131.36(b)(1) that includes numeric criteria for toxic substances.
- B. IDAPA 58.01.02.200.05 - Surface waters of the State shall be free from floating, suspended, or submerged matter of any kind in concentrations causing nuisance or objectionable conditions or that may impair designated beneficial uses.
- C. IDAPA 58.01.02.200.08 - Sediment. Sediment shall not exceed quantities specified in section 250, or, in the absence of specific sediment criteria, quantities which impair designated beneficial uses. Determinations of impairment shall be based on water quality monitoring and surveillance and the information utilized as described in Subsection 350.02.b.
- D. IDAPA 58.01.02.250.01.a. - Hydrogen ion concentration (pH) values within the range of 6.5 to 9.5 standard units.
- E. IDAPA 58.01.02.250.01.c.i. - The one-hour average concentration of total residual chlorine shall not exceed 19 ug/L.
- F. IDAPA 58.01.02.250.01.c.ii. - The four-day average concentration of total residual chlorine shall not exceed 11 ug/L.
- G. IDAPA 58.01.02.250.02.b. – Water temperatures of 22 degrees C or less with a maximum daily average of no greater than 19 degrees C.
- H. IDAPA 58.01.02.250.02.e - Waters designated for salmonid spawning are to exhibit the following characteristics during the spawning period and incubation for the particular species inhabiting those waters:
 - 1. IDAPA 58.01.02.250.02.e.i - Intergravel dissolved oxygen shall have a one day minimum of not less than 5.0 mg/L and a seven day average mean of not less than 6.0 mg/L.
 - 2. IDAPA 58.01.02.250.02.e.ii - Water column dissolved oxygen shall have a one day minimum of not less than 6.0 mg/L or 90% saturation, whichever is greater; and water temperatures of 13 degrees C or less with a maximum daily average no greater than 9 degrees C.
- I. IDAPA 58.01.02.250.02.c.i - The one hour average concentration of un-ionized ammonia (as N) is not to exceed $(0.43/A/B/2)$ mg/L, where:

A = 1 if the water temperature (T) is $\leq 20^{\circ}\text{C}$, or

$$A = 10^{(0.03(20-T))} \text{ if } T < 20^{\circ}\text{C, and}$$

$$B = 1 \text{ if the pH is } \geq 8.0, \text{ or}$$

$$B = (1 + 10^{(7.4-\text{pH})}) \div 1.25 \text{ if pH is } < 8.0$$

- J. IDAPA 58.01.02.250.02.c.ii - The four day average concentration of un-ionized ammonia (as N) is not to exceed $(0.66/A/B/C)$ mg/L, where:

$$A = 1.4 \text{ if } T \text{ is } \geq 15^{\circ}\text{C, or}$$

$$A = 10^{(0.03(20-T))} \text{ if } T < 15^{\circ}\text{C, and}$$

$$B = 1 \text{ if the pH is } \geq 8.0, \text{ or}$$

$$B = (1 + 10^{(7.4-\text{pH})}) \div 1.25 \text{ if pH is } < 8.0$$

$$C = 13.5 \text{ if pH is } \geq 7.7, \text{ or}$$

$$C = 20(10^{(7.7-\text{pH})}) \div (1 + 10^{(7.4-\text{pH})}) \text{ if the pH is } < 7.7$$

- K. IDAPA 58.01.02.251.01 Waters designated for primary contact recreation are not to contain *E. coli* bacteria significant to the public health in concentrations exceeding:

1. 406/100 ml at any time, and
2. a geometric mean of 126/100 ml based on a minimum of five samples taken every 3 to 5 days over a thirty day period.

II. Anti-Degradation Policy

The State of Idaho has adopted an anti-degradation policy as part of their water quality standards. The anti-degradation policy represents a three-tiered approach to maintain and protect various levels of water quality and uses. The three tiers of protection are as follows:

- A. **Tier 1 – Maintenance of Existing Uses for all Waters** - The existing in stream uses and the level of water quality necessary to protect the existing uses must be maintained and protected.
- B. **Tier 2 – High Quality Water** – Where the quality of the water exceeds levels necessary to support propagation of fish, shellfish and wildlife and recreation in and on the water, that quality must be maintained and protected unless the Department finds, after full satisfaction on the intergovernmental coordination and public participation provisions of the Department's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the Department must assure water quality adequate to protect existing uses fully.
- C. **Tier 3 - Outstanding Resource Waters** – Where high quality waters constitute an outstanding natural resource, such as waters of national and state parks and wildlife refuges, and waters of exceptional recreational or ecological significance, that water must be maintained and protected from the impacts of point and

nonpoint source activities. In the Idaho Water Quality Standards Regulations, Outstanding Resource Waters are designated as “Special Resource Waters.”

The South Fork Clearwater River is a Tier 3 water body. Therefore, water quality shall be maintained and protected from the impacts of point and nonpoint source activities. Degradation is not allowed under any circumstances. An NPDES permit cannot be issued that would result in the water quality criteria being violated. The draft permit contains effluent limits which ensures that the existing beneficial uses for the South Fork Clearwater River will be maintained.

III. Anti-Degradation Analysis

This permit reissuance for the City of Stites is for an existing wastewater treatment facility to discharge to a Special Resource Water as defined by the Idaho Water Quality Standards. The South Fork Clearwater River is designated as a Special Resource Water (SRW) according to the Idaho WQS, subsection 120.07, and provisions of section 56 and 400 apply. No existing point source can increase its discharge of pollutants above the design capacity of its existing wastewater treatment facility to a SRW if pollutants significant to the designated beneficial uses can result in a reduction of the ambient water quality measured below the mixing zone. EPA Region 10 considers a reduction of ambient water quality to be equivalent to a lowering of water quality defined in WQS subsection 003.56. That definition includes the concepts that a change in a chemical, physical, or biological parameter of water relevant to a beneficial use that is measurable and is adverse is considered a lowering of water quality.

Since only one constituent was not lower than the existing permit, the consideration of the SRW requirements was focused on that parameter.

The proposed permit has no limits on fecal coliform bacteria and *E. coli* bacteria limits of 126 cfu/100 ml. The existing permit allowed 100 cfu/100 ml but had no limits on *E. coli* bacteria. This change corresponds with changes in Idaho’s WQS, adopted in 2000, wherein instream fecal coliform criteria was replaced by *E. coli* criteria. That change was in turn based upon guidance from EPA that fecal coliform were no longer considered reliable criteria to protect recreational uses and that states should adopt *E. coli* criteria instead (see EPA’s 1999 *Action Plan for Beaches and Recreational Waters*). Therefore, EPA Region 10 does not consider restricting wastewater discharges to meet a new *E. coli* instream standard a reduction in water quality since in EPA’s judgement fecal coliform counts are not reliable water quality indicators.

APPENDIX B
BASIS FOR EFFLUENT LIMITATIONS

The CWA requires dischargers to meet performance-based requirements (also known as technology-based effluent limits). EPA may find by analyzing the effect of an effluent discharge on the receiving water, that technology based effluent limits are not sufficiently stringent to meet water quality standards. In such cases, EPA is required to develop more stringent, water quality-based effluent limits designed to ensure that water quality standards are met. The draft effluent limits reflect whichever limits (technology-based or water quality-based) are more stringent. The following explains in more detail the derivation of technology based effluent limits and water quality based effluent limits.

I. Technology-Based Effluent Limitations

Section 301 of the CWA established a required performance level, referred to as “Secondary treatment,” that all POTWs were required to meet by July 1, 1977. EPA developed “secondary treatment” regulations which are specified in 40 CFR Part 133. These technology-based effluent limits apply to all municipal wastewater treatment plants and identify the minimum level of effluent quality attainable by secondary treatment in terms of BOD₅, TSS, and pH. The definition of “secondary treatment” includes special considerations regarding waste stabilization ponds. The regulations allow alternative limits for facilities, including the City of Stites, using waste stabilization ponds. These alternative limits are called “treatment equivalent to secondary treatment.” Furthermore, the State of Idaho has adjusted the suspended solids effluent limitations for waste stabilization ponds in accordance with 40 CFR 133.103(c) (IDAPA 58.01.01.420.02.b.ii). The technology-based limits applicable to the discharge from the City of Stites are as follows:

- A. The BOD₅ and TSS concentration and mass limitations have been calculated based on the total design flow from the City of Stites facility.

Table 1. Existing BOD₅ and TSS Limitations		
Parameter	Average Monthly	Average Weekly
BOD ₅ , mg/L (lb/day)	45 (26)	65 (38)
TSS, mg/L (lb/day)	70 (41)	105 (61)

- B. The proposed effluent limits for BOD₅ and TSS are as follows:

<u>Parameter</u>	<u>Monthly Average</u>	<u>Weekly Average</u>	<u>Percent Removal</u>
Biochemical Oxygen Demand, (5-day) mg/L	45	65	65
Total Suspended Solids, mg/L	70	105	65

EPA methodology and regulations at 40 CFR 122.45(b) and 122.45(f) require BOD₅ and TSS limitations to be expressed as mass based limits using the design flow (0.07 mgd) of the facility. The loading is calculated as follows:

concentration X design flow X 8.34. Using this formula the BOD₅ and TSS permit limits are:

BOD₅ loading, monthly average = 45 mg/L X 0.070 MGD X 8.34 = 26 lb/day

BOD₅ loading, weekly average = 65 mg/L X 0.070 MGD X 8.34 = 38 lb/day

TSS loading, monthly average = 70 mg/L X 0.070 MGD X 8.34 = 41 lb/day

TSS loading, weekly average = 105 mg/L X 0.070 MGD X 8.34 = 61 lb/day

- C. Federal regulations at 40 CFR § 133.102(c) require the pH to be in the range of 6.0 to 9.0 S.U. Evaluation of compliance data show that the facility is able to meet this requirement. The limits in the permit are based on the more stringent of the water quality criteria (6.5 - 9.5) and technology-based limits and are 6.5 to 9.0 S.U.

II. Water Quality-based Evaluation

A. Statutory Basis for Water Quality-Based Limits

Section 301(b)(1)(C) of the CWA requires the development of limitations in permits necessary to meet water quality standards by July 1, 1977. Discharges to state waters must also comply with limitations imposed by the state as part of its certification of NPDES permits under section 401 of the CWA.

The NPDES regulation (40 CFR 122.44(d)(1)) implementing section 301(b)(1)(C) of the CWA requires that permits include limits for all pollutants or parameters which “are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard, including state narrative criteria for water quality.”

The regulations require that this evaluation be made using procedures which account for existing controls on point and nonpoint sources of pollution, the variability of the pollutant in the effluent, species sensitivity (for toxicity), and where appropriate, dilution in the receiving water. The limits must be stringent enough to ensure that water quality standards are met, and must be consistent with any available wasteload allocation.

B. Reasonable Potential Determination

When evaluating the effluent to determine if water quality-based effluent limits are needed based on chemical specific numeric criteria, a projection of the receiving water concentration (downstream of where the effluent enters the receiving water) for each pollutant of concern is made. The chemical specific concentration of the effluent and ambient water and, if appropriate, the dilution available from the ambient water are factors used to project the receiving water concentration. If the projected concentration of the receiving water exceeds the numeric criterion for a specific chemical, then there is a reasonable potential that the discharge may cause or contribute to an excursion above the applicable water quality standard, and a water quality-based effluent limit is required. If the projected concentration is less than the criterion, then no water quality-based limits are needed.

As mentioned above, sometimes it is appropriate to allow a small area of ambient water to provide dilution of the effluent. These areas are called mixing zones.

Mixing zone allowances will increase the mass loading of the pollutant to the water body, and decrease treatment requirements. Mixing zones can be used only when there is adequate ambient flow volume and the ambient water is below the criteria necessary to protect designated uses. EPA has determined that allowing a mixing zone with 25 percent of the stream flow (based on Idaho water quality standards) would be protective of downstream beneficial uses.

1. Procedure for Deriving Water Quality-Based Effluent Limits

The first step in developing a water quality based permit limit is to develop a wasteload allocation for the pollutant. A wasteload allocation is the concentration (or loading) of a pollutant that the Permittee may discharge without causing or contributing to an exceedance of water quality standards in the receiving water. Wasteload allocations are determined in one of the following ways:

a. TMDL-Based Wasteload Allocation

Where the receiving water quality does not meet water quality standards, the wasteload allocation is generally based on a TMDL developed by the State. A TMDL is a determination of the amount of a pollutant from point, non-point, and natural background sources, including a margin of safety, that may be discharged to a water body without causing the water body to exceed the criterion for that pollutant. Any loading above this capacity risks violating water quality standards.

Section 303(d) of the CWA requires states to develop TMDLs for water bodies that will not meet water quality standards after the imposition of technology-based effluent limitations to ensure that these waters will come into compliance with water quality standards. The first step in establishing a TMDL is to determine the assimilative capacity (the loading of pollutant that a water body can assimilate without exceeding water quality standards). The next step is to divide the assimilative capacity into allocations for non-point sources (load allocations), point sources (wasteload allocations), natural background loadings, and a margin of safety to account for any uncertainties. Permit limitations are then developed for point sources that are consistent with the wasteload allocation for the point source.

The Idaho Department of Environmental Quality (IDEQ) is scheduled to complete a TMDL for the South Fork Clearwater River in December 2002. Because the TMDL will not be completed before reissuance of the permit, the draft permit only requires monitoring for the parameters of concern under the TMDL.

b. Mixing zone based WLA

When a mixing zone for the discharge is authorized, the WLA is calculated by using a simple mass balance equation. The equation takes into account the available dilution provided by the mixing zone, and the background concentrations of the pollutant.

c. Criterion as the Wasteload Allocation:

In some cases a mixing zone cannot be authorized, either because the receiving water already exceeds the criteria or the receiving water flow is too low to provide dilution. In such cases, the criterion becomes the wasteload allocation. Establishing the criterion as the wasteload allocation ensures that the Permittee will not contribute to an exceedance of the criteria. In the case of Stites, EPA will certify that a mixing zone allowing 25 percent of available dilution will be protective of beneficial uses.

Once the wasteload allocation has been developed, the EPA applies the statistical permit limit derivation approach described in Chapter 5 of the *Technical Support Document for Water Quality-Based Toxics Control* (EPA/505/2-90-001, March 1991, hereafter referred to as the TSD) to obtain monthly average, and weekly average or daily maximum permit limits. This approach takes into account effluent variability, sampling frequency, and water quality standards.

C. Water Quality-Based Effluent Limits

1. Toxic Substances

The Idaho water quality standards require surface waters of the state to be free from toxic substances in concentration that impair designated uses. Based upon evaluation of data from the facility, EPA has determined that the narrative criteria will be protected by including a technology-based effluent limit for total residual chlorine.

2. Floating, Suspended or Submerged Matter

The Idaho water quality standards require surface waters of the state to be free from floating, suspended, or submerged matter of any kind in concentrations causing nuisance or objectionable conditions or that may impair designated beneficial uses. Therefore, the draft permit specifies that there must be no discharge of floating solids or visible foam in other than trace amounts.

3. *E. coli* Bacteria

The South Fork Clearwater River is not listed as water-quality limited for pathogens. New water quality standards adopted by Idaho in May 2000 removed the fecal coliform limits and adopted *E. coli* bacteria limits. The Idaho state water quality standards require waters designated for primary contact recreation not contain *E. coli* bacteria in amounts exceeding:

- a. a single sample of 406/100 ml; and
- b. a geometric mean of 126/100 ml based on a minimum of five samples taken every three to five days over a thirty-day period.

These limits have been included in the draft permit.

4. pH

The pH limits are the most stringent of the Idaho state water quality criteria for pH (6.5 to 9.5) and the technology-based limits of 6.0 to 9.0. The proposed permit includes effluent limits for pH within the range of 6.5 - 9.0 standard units.

5. Total Residual Chlorine (TRC)

A Reasonable Potential Analysis was conducted to determine if instream concentrations of TRC at the outfall could exceed water quality criteria. Results of this analysis showed that instream concentrations of TRC at the outfall did have the potential to exceed water quality criteria. Therefore, water quality-based effluent limitations were calculated for the discharge. However, water quality-based TRC effluent limits were found to be less stringent than technology-based limits. Therefore, technology-based effluent limits have been included in the proposed permit. The Water Pollution Control Federation's *Chlorination of Wastewater* (1976) states that a properly designed and maintained wastewater treatment facility can achieve adequate disinfection if a 0.5 mg/L chlorine residual is maintained after 15 minutes of contact time. A treatment plant that provides adequate chlorination contact time can meet the 0.5 mg/L limit on a monthly average basis.

Additionally, the NPDES regulation at 40 CFR 122.45(d) requires permit limits for publicly owned treatment works be expressed as average monthly limits (AMLs) and average weekly limits (AWLs) unless impracticable. The AWL is expressed as $1.5 \times \text{AML}$, or, in this case, 0.75 mg/L.

Since the federal regulation at 40 CFR 122.45(f) requires limitations to be expressed as mass-based limits using the design flow of the facility, mass-based limits have been added to the draft permit. Mass-based limits may be calculated from concentration limits as follows: concentration \times design flow \times 8.34.

monthly average = $0.5 \text{ mg/L} \times 0.07 \text{ mgd} \times 8.34 = 0.29 \text{ lb/day}$

weekly average = $0.75 \text{ mg/L} \times 0.07 \text{ mgd} \times 8.34 = 0.44 \text{ lb/day}$

The average monthly limit is 0.5 mg/L (0.29 lb/day) and the maximum daily limit is 0.75 mg/L (0.44 lb/day).

6. Dissolved Oxygen

The South Fork Clearwater River is not listed as water quality-limited for dissolved oxygen (D.O.). The state water quality standards require the level of D.O. to exceed 6 mg/L at all times for water bodies that are protected for aquatic life use. Effluent data are not available to determine if the facility is meeting this requirement. Effluent monitoring will be required in the draft permit in order to determine if the facility will require a permit limit in the future.

7. Temperature

The South Fork Clearwater River is listed as water quality-limited for temperature. The state water quality standards require temperatures of 22 degrees C or less with a maximum daily average of no greater than 19 degrees C. Effluent data are not available to determine if the facility is meeting this requirement. Effluent monitoring will be required in the draft permit in order to determine if the facility will require a permit limit in the future.

8. Sediment

The South Fork Clearwater River is listed as water quality-limited for sediment. Sediment shall not exceed quantities specified in section 250, or, in the absence of specific sediment criteria, quantities which impair designated beneficial uses. No specific criteria are listed in section 250. Effluent data are not available to determine if the facility is meeting this requirement. Effluent monitoring will be required in the draft permit in order to determine if the facility will require a permit limit in the future.

9. Total Ammonia

IDEQ has developed water quality criteria to protect aquatic life against short term and long term adverse impacts from ammonia. Effluent data are not available to determine if the facility is meeting this requirement. Effluent monitoring will be required in the draft permit in order to determine if the facility will require a permit limit in the future.

Reasonable Potential Analysis for Total Residual Chlorine

In the case of the South Fork Clearwater River the beneficial use that needs to be protected is aquatic life. The acute criterion for chlorine is 0.019 mg/L and the chronic criterion is 0.011 mg/L. The acute criterion protects against short term impacts to aquatic life, and the chronic criterion protects against long term impacts to aquatic life.

When evaluating the effluent to determine if a water quality-based effluent limit (WQBEL) is needed based on chemical-specific numeric criteria, a projection of the receiving water concentration (downstream of where the effluent enters the receiving water) for the pollutant of concern is made. If the projected concentration of the receiving water exceeds the applicable numeric criterion, then there is a reasonable potential that the discharge may cause or contribute to an excursion above the applicable water quality standards, and a WQBEL is required.

The following mass balance equation is used to determine the downstream receiving water concentration:

$$C_d = \frac{(C_e \times Q_e) + (C_u \times (Q_u \times \%MZ))}{Q_e + (Q_u \times \%MZ)}$$

where,

C_d = receiving water concentration downstream of the effluent discharge

C_e = maximum projected effluent concentration = 1.98 mg/L

Q_e = maximum effluent flow = 0.108 cfs

C_u = upstream concentration of pollutant = 0.0 mg/L

Q_u = upstream flow = 91.3 cfs (7Q10)

%MZ = assume 25 percent mixing zone is authorized by EPA

When determining the projected receiving water concentration, EPA's *Technical Support Document for Water Quality-based Toxics Controls* (TSD, 1991) recommends using the maximum projected effluent concentration. To determine the maximum projected effluent concentration (C_e) EPA has developed a statistical approach to better characterize the effects of effluent variability. The approach combines knowledge of effluent variability as estimated by a coefficient of variation (CV) with the uncertainty due to a limited number of data to project an estimated maximum concentration for the effluent. Once the CV has been calculated, the reasonable potential multiplier used to derive the maximum projected effluent concentration (C_e) can be found in Table 3-1 of EPA's TSD. A reasonable potential multiplier may vary from a low of 1 to a high of 368. Enough data was available for the City of Stites discharge to calculate a facility-specific CV of 0.165.

The maximum projected concentration (C_e) for the effluent is equal to the highest observed concentration value of the data set multiplied by the reasonable potential multiplier. For the City of Stites, enough data was available to calculate a facility-specific CV. Data from January 31, 1995 through March 31, 2001 was used to determine the maximum projected concentration. The highest value observed was 1.8 mg/L. The CV is 0.165. The reasonable potential multiplier is 1.1. The maximum projected concentration (C_e) is 1.98 mg/L (1.8 X 1.1).

The downstream receiving water concentration (C_d) is:

$$C_d = \frac{(C_e \times Q_e) + (C_u \times (Q_u \times \%MZ))}{Q_e + (Q_u \times \%MZ)}$$

or

$$C_d = \frac{(1.98 \times 0.108) + (0.0 \times (91.3 \times 0.25))}{0.108 + (91.3 \times 0.25)}$$

$$C_d = 0.0093 \text{ mg/L}$$

The projected concentration downstream does not exceed the chronic criterion for chlorine (0.011) mg/L). Therefore, a water quality-based effluent limit is not required.

Because no water quality-based effluent limits for TRC are required, the proposed permit includes the technology-based TRC effluent limits of 0.5 mg/L (average monthly) and 0.75 mg/L average weekly limit. Federal regulations at 40 CFR § 122.45(f) require effluent limits to be expressed as mass-based limits. The mass loading limits for TRC follow.

$$\text{AML} = (\text{AML concentration, mg/L}) \times 8.34 \text{ (conversion factor)} \times 0.07 \text{ mgd (design flow)}$$

$$\text{AML, lbs/day} = 0.5 \text{ mg/L} \times 8.34 \times .07 \text{ mgd} = 0.29 \text{ lbs/day}$$

$$\text{MDL, lbs/day} = 0.75 \text{ mg/L} \times 8.34 \times .07 \text{ mgd} = 0.44 \text{ lbs/day}$$

APPENDIX C

ENDANGERED SPECIES ACT

Section 7 of the Endangered Species Act (ESA) requires federal agencies to request a consultation with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) regarding potential effects an action may have on listed endangered species.

The USFWS website for Idaho County, Idaho identified the sockeye salmon as being the only federally-listed endangered species occurring in Idaho County, Idaho (the location of the Stites Wastewater Treatment Plant discharge). Threatened species occurring in Idaho County include the Canada lynx, grizzly bear, spring/summer chinook salmon, fall chinook salmon, steelhead, bull trout, bald eagle, MacFarlane's four-o'clock, water howellia, and Ute ladies'-tresses.

Sockeye salmon (*Oncorhynchus nerka*) - Endangered

Sockeye salmon are the third most abundant of the five Pacific salmon species in North America. These fish exhibit a greater variety of life history patterns than any other species within the genus, *Oncorhynchus*. Anadromous sockeye rear in lakes for 1-2 years, then migrate out to sea for 2-3 years before returning to freshwater. Residual populations of sockeye, also known as kokanee, remain in freshwater throughout their life cycle. Sockeye undergo a remarkable transformation in color and shape as they return to freshwater to spawn. The heads of both male and female fish turn bright green, while the bodies turn bright red. Male fish also develop humped backs and severely hooked jaws. The distribution of sockeye salmon ranges to both sides of the Pacific Ocean. Sockeye salmon migrate extensively in the sea to areas in the North Pacific, Bristol Bay, and the Bering Sea. They do not reside in coastal waters during their oceanic life stage (R. Gustafson, NMFS, personal communication, 10 August 1998).

Threats to Snake River sockeye salmon include hydropower development, agricultural uses of water, commercial fisheries in the lower Columbia River, drought, and hatchery programs. Agricultural uses of water involve withdrawing water from rivers for storage, diverting water for irrigation, and blockage of habitat for agricultural purposes. All of these practices contribute to the destruction of Snake River sockeye habitat. Commercial harvest on the lower Columbia River and on sockeye spawning grounds contributed significantly to the decline of the species in the past. Fish reared in hatchery programs may impact Snake River sockeye as they jointly migrate through the rivers, estuaries and ocean, and may compete with sockeye for food (NMFS, 1996c).

Critical habitat established by NMFS includes the Columbia, Snake, and Salmon Rivers, and a number of lakes, including Redfish Lake (58FR68543). Sockeye salmon are native to the Snake River and historically were abundant in several lake systems in Idaho and Oregon. In this century, a variety of factors (including overfishing, irrigation diversions, obstacles to migrating fish, and eradication through poisoning) have led to the demise of all Snake River sockeye salmon except those returning to Redfish Lake in the Stanley Basin of Idaho. These fish spawn on the shoals of Redfish Lake in the fall, and fry emerge in the spring. Returns to Redfish Lake between 1989-1994 have numbered fewer than ten fish. Adults of this population travel farther from the sea (about 900 miles) and to a higher elevation (6,500 feet) than adults of any other population (NMFS, 1996c).

While NMFS has designated Columbia, Snake, and Salmon Rivers as critical habitat for the Snake River sockeye salmon, the South Fork Clearwater River is not considered critical habitat for this species. In addition, the Snake River sockeye salmon is not known to occur in the South Fork

Clearwater River. Therefore, it is not expected that reissuance of the wastewater discharge permit to the Stites Wastewater Treatment Plant will affect Snake River sockeye salmon.

Canada lynx (*Lynx canadensis*) - Threatened

The Canada lynx (*Lynx canadensis*), the only lynx in North America, is a secretive, forest-dwelling cat of northern latitudes and high mountains. It feeds primarily on small mammals and birds and is especially dependent on snowshoe hare for prey. It was historically found throughout much of Canada, the forests of northern tier States, and subalpine forests of the central and southern Rocky Mountains. Threats to lynx from changes in water quality would be through direct drinking water exposure.

No information is currently available regarding populations of Canada lynx in the South Fork Clearwater area. However, because the only direct threats to the lynx from the Stites Wastewater Treatment Plant discharge would be through direct drinking water exposure, there should be no impact on the lynx from the discharge. The facility discharges only domestic waste, and the facility's current discharge shows no metals, or other toxics. The proposed permit requires monitoring for potentially harmful contaminants. Therefore, it is not expected that reissuance of the wastewater discharge permit to the Stites Wastewater Treatment Plant will affect Canada lynx.

Grizzly bear (*Ursus arctos horribilus*) - Threatened

Current grizzly bear habitat in Idaho is limited to the Selkirk Mountains in the northern panhandle; although there are occasional sightings in the Bitterroot National Forest near the Montana border and in the Greater Yellowstone area. The primary threat to grizzly bear survival is the penetration and fragmentation of habitat by roads and related mortality associated with human activity.

Primary exposure to toxics or other contaminants would be through direct drinking water exposure. The limited data available on grizzly bear diet in the Selkirk Mountain population (the closest population for which data are available) indicates that grizzly are primarily vegetarian (Almack, 1985). As a result, this population is not subject to the adverse effects from consumption of toxics through bioconcentration in prey species that may pose a threat to higher trophic level predators.

Evaluation of recovery and management plans for the grizzly bear show that current populations of grizzly bears are concentrated in the Selway Bitterroot Wilderness Area in the western part of Idaho County. There is not a documented population of grizzlies in the South Fork Clearwater River area. Therefore, it is not expected that reissuance of the wastewater discharge permit to the Stites Wastewater Treatment Plant will affect grizzly bears.

Chinook Salmon (*Oncorhynchus tshawytscha*) - Threatened

Chinook salmon are the largest of the five Pacific salmon species occurring in North America. The commercial fishing industry values chinook salmon highly, due in no small part to their large size. Also known as king salmon, these fish are caught using gill nets in both the high seas salmon fishery as well as coastal fisheries. Their migration patterns exhibit a high degree of variability as do their ages at seaward migration, and their distribution spans both sides of the Pacific Ocean (Groot and Margolis, 1991).

Chinook salmon (from here on referred to as chinook) have a diversity of juvenile and adult life history strategies. Biological characterization of chinook populations differentiates these fish into two primary population segments: spring/summer and fall chinook (NMFS 1995).

1. Snake River spring/summer chinook salmon

Migrating adult spring chinook enter the Columbia River between February and May, and adult summer chinook enter in June and July (Bevan et al. 1994). Both spring and summer chinook spawn in high elevation tributaries from August through September and offspring rear in streams for one year before emigrating to the ocean in the spring (April through June). Ocean residency varies but is generally one to four years.

Snake River spring/summer chinook are distributed throughout the Snake River mainstem and its tributaries. The mainstem provides spawning and rearing habitat for chinook as well as a migration corridor (USFS 1994). Critical habitat, which includes all river reaches presently or historically accessible, has been designated for this threatened species by the NMFS (58 Fed. Reg. 68543). These reaches are the Columbia, Snake, and Salmon rivers and all Snake River and Salmon River tributaries except the Clearwater River. Areas not included as critical habitat for Snake River spring/summer chinook are those reaches above impassable natural falls and Dworshak and Hells Canyon dams. Also, NMFS has proposed excluding the reach above Napias Creek Falls, as this barrier is considered a historical blockage to chinook access of upper Napias Creek (Federal Register Vol. 64, No.105, June 1999).

The native runs of chinook salmon in the Clearwater River subbasin were nearly, if not totally, eliminated by hydropower development. In 1927, Island Power and Light Company built a dam on the river near its mouth at Lewiston, Idaho. From 1927 through 1940, inadequate adult fish passage in the dam's fish ladder virtually eliminated salmon runs into the basin (CBFWA 1990). Fulton (1968) stated the dam "prevented passage" during the 14-year period, but the area above the dam was subsequently made available to salmon by improvements to the fishway in 1940. He further stated that chinook salmon returning since then were from "re-stocking." Holmes (1961) provided a detailed record of fish passage at the dam. Spring and summer chinook salmon were observed during only 3 years prior to 1950, after which counts were conducted annually. Counts of 311 and 102 spring and/or summer chinook salmon were reported in 1928 and 1929, respectively. In 1938, only two fish were counted. When counting resumed in 1950, seven chinook salmon were observed passing the dam during the time period typical for spring- or summer-run fish. Some or all of these fish could have been from either restocking or straying (Chapman et al. 1991). The dam was removed in 1973. Harpster Dam on the South Fork of the Clearwater River blocked chinook salmon runs into this tributary (CBFWA 1990).

Based on these data, NMFS has concluded that upper reaches of the Clearwater River (including the South Fork Clearwater River) "are not considered critical for the conservation of listed Snake River Spring/summer chinook salmon" (58FR68543). Therefore, it is not expected that reissuance of the wastewater discharge permit to the Stites Wastewater Treatment Plant will affect Snake River Spring/summer chinook salmon.

2. Snake River fall chinook salmon

Snake River fall chinook have a life history pattern typical of 'ocean-type' chinook. Generally, ocean-type chinook spend all of their oceanic life in coastal waters less than 1000 km from their natal streams and return to spawn in those natal streams in the fall at age 2-5. Emergent fry migrate seaward slowly from the mainstem Snake River within several weeks of emergence (NMFS, 1996a). Most fall chinook have migrated to sea within their first year. In the ocean,

juvenile fall chinook feed primarily on herring, pelagic amphipods and crab megalopa, while adult fish feed on herring and squid (Groot and Margolis, 1991).

Threats to fall chinook include hydropower development, commercial, recreational and sports fisheries, drought, and poor ocean survival. Hydropower development is commonly regarded as the most substantial threat to the survival of fall chinook for three reasons: alteration/inundation of salmon habitat, mortality associated with downstream migration of juveniles, and migration delay due to the presence and operation of dams on the Snake and Columbia Rivers (NMFS, 1996a).

NMFS has designated critical habitat for Snake River fall chinook on the Columbia, Snake and Deschutes Rivers in Oregon, Washington, and Idaho (58FR68543, 63FR11515). NMFS has not designated the South Fork Clearwater River as critical habitat for the Snake River fall run chinook salmon. Therefore, it is not expected that reissuance of the wastewater discharge permit to the Stites Wastewater Treatment Plant will affect Snake River fall chinook salmon.

Steelhead (*Oncorhynchus mykiss*) - Threatened

Steelhead have the most complex life histories of any Pacific salmon species. These fish have variable run timing and degree of anadromy and are capable of more than one spawning cycle. In the Snake River subbasin, steelhead are 'stream-maturing' as they enter freshwater in a sexually immature state and require several months in freshwater before they mature then spawn. These stream maturing fish are referred to as 'summer run' based on the time that they enter freshwater. Summer steelhead of the Snake River subbasin have generally two potential run timings. The A-run enters freshwater from June to August and the B-run enters fresh water from late August to October. A-run fish have generally spent one year in the ocean while B-run fish have spent two.

Steelhead can have various life histories in terms of the degree of anadromy. The anadromous form that migrates between the ocean and freshwater are termed 'steelhead', while the non-anadromous or 'resident' form does not migrate and is called 'rainbow trout'. Like steelhead, rainbow trout spawn in winter/spring and emerge in spring/early summer. In inland *O. mykiss* populations, including the upper Snake River basin, both anadromous and non-anadromous forms commonly co-occur. Although both the anadromous and non-anadromous forms are classified as the same species taxonomically, the relationship of the two forms in a given area is typically unclear. The migratory and resident forms of this species may be ecophenotypes within a common gene pool or they may be distinct due to reproductive isolation (Zimmerman and Reeves 2000).

The primary factors that have affected Steelhead populations are dam construction (which restricts the ability of individuals to reach their spawning areas); and habitat loss and degradation due to human activities such as land development, logging, mining, and agriculture.

The South Fork Clearwater River has been designated as critical habitat for the Snake River Steelhead and the Clearwater stock of Steelhead salmon has been identified as a population of special concern. However, reissuance of the wastewater discharge permit to the Stites Wastewater Treatment Plant would not affect Steelhead. As discussed above, the primary threats to Steelhead are dams and habitat degradation. Reissuance of the Stites wastewater discharge permit would not lead to increased dam construction or habitat degradation. Therefore, reissuance of the permit would not affect Steelhead.

Bull Trout (*Salvelinus confluentus*) - Threatened

The bull trout is a member of the char subgroup of the family Salmonidae. Bull trout populations are known to exhibit two distinct life history forms: 1) resident bull trout that spend their entire life cycle in the same (or nearby) streams in which they were hatched, and 2) migratory bull trout which can exhibit either a fluvial life history- spawning in tributary streams where the young rear from one to four years before migrating to a river, or an adfluvial form--spawning in tributary streams where the young rear before migrating to a lake (Fraley and Shepard 1989).

Bull trout generally mature at between 5 and 7 years of age (Fraley and Shepard 1989; Goetz 1989; Leathe and Enk 1985). Spawning occurs from August through November (Armstrong and Murrow 1980; Brown 1994; McPhail and Murray 1979). Embryos incubate over winter and hatch in late winter or early spring (Weaver and White 1985). Emergence has been observed over a relatively short period of time after a peak in stream discharge from early April through May (Rieman and McIntyre 1993).

In-stream habitat requirements make bull trout exceptionally sensitive to activities which directly or indirectly affect stream channel integrity and natural flow patterns, including groundwater flow. Stream flow, bed load movement, and channel instability influence the survival of juvenile bull trout (Weaver 1985; Goetz 1989). The presence of fine sediments reduces pool depth, alters substrate composition, reduces interstitial spaces in substrate, and causes channel braiding, all of which can negatively impact the survival of bull trout eggs and fry. Cover, such as large woody debris, undercut banks, boulders, pools, side margins, and beaver ponds, is heavily utilized by all life stages of bull trout for rearing, foraging and resting habitat, as well as for protection from predators (USFWS 1998a). Bull trout prefer cold waters, and temperatures in excess of 15 °C are considered to limit their distribution (Rieman and McIntyre 1993). USACE (1999) suggested that water temperature in fact influences bull trout distribution more than any other habitat factor. Finally, migration corridors are important for sustaining bull trout populations, allowing for gene flow and connecting wintering areas to summer/foraging habitat (Rieman and McIntyre 1993).

The bull trout is threatened by habitat degradation (e.g., land management activities with negative impacts on water quality or spawning habitat); passage restrictions, mortality, or entrapment at dams; and competition from non-native lake and brook trout (USFWS 1998b). According to USACE (1999), bull trout populations are likely affected by dam operation as well as augmentation (i.e., spill) used to mitigate effects on salmon migration by increasing fish passage efficiency. Bull trout growth, survival and long-term population persistence are correlated with stream habitat conditions such as cover, channel stability, substrate composition, temperature, and migratory corridors (Rieman and McIntyre 1993). These habitat features are often impaired as the result of land management activities such as forest harvest, road building, hydropower development, irrigation diversions, and grazing. Mining has altered stream channel morphology, increased sediment transport and deposition, decreased vegetative cover, and contributed to acidic water discharge and heavy metal water pollution (Chapman et al. 1991).

Reissuance of the wastewater discharge permit to the Stites Wastewater Treatment Plant would not affect bull trout. As discussed above, the primary threats to bull trout are changes in water temperature and habitat degradation. Reissuance of the Stites Wastewater Treatment Plant wastewater discharge permit would not lead to increased habitat degradation. In addition, the facility will be required to monitor for temperature in both its effluent and upstream waters. Therefore, reissuance of the permit would not affect bull trout.

Bald eagle (*Haliaeetus leucocephalus*) - Threatened

Bald eagles begin to appear at wintering sites in early November and concentrate at locations with open water during the colder months when smaller or slower moving waterbodies freeze (Spahr

1990). Diet includes fish species, mule deer, ground squirrels, rabbits, waterfowl, and other small mammals (Spahr 1990). Consumption of fish relative to other species declines in the colder months as waterbodies freeze. Water quality could potentially affect bald eagles through four avenues: prey displacement or quantitative decline, prey mortality, bioaccumulation in prey, or direct consumption. The USFWS has not designated critical habitat in Idaho for the bald eagle, but there is a Bald Eagle Recovery Plan (FWS 1986). One of the general recommendations for augmenting bald eagle populations is to reduce mortality through exposure to contaminants.

The bald eagle historically ranged throughout North America except for extreme northern Alaska and Canada and central and southern Mexico. A significant population of bald eagles winters in Idaho and some are presumed to remain in the state year round. In Idaho, bald eagle winter habitat includes the Coeur d'Alene Lake and River, Pend Orielle Lake and River, Snake River, Priest River, Clearwater River, and the American Falls Reservoir.

As discussed above, the primary threats to bald eagles are prey displacement or mortality, bioaccumulation of contaminants through prey species, or direct exposure to contaminants. However, reissuance of the Stites Wastewater Treatment Plant wastewater discharge permit would not affect prey availability/distribution. It would also not result in a potential increase of toxic compounds in prey species or an increase in the potential for direct exposure to toxics. The facility discharges only domestic waste, and the facility's current discharge shows no metals, or other toxics. The proposed permit requires monitoring for potentially harmful contaminants. Therefore, it is not expected that reissuance of the wastewater discharge permit to the Stites Wastewater Treatment Plant would affect bald eagles.

MacFarlane's Four-O'clock (*Mirabilis macfarlanei*) - Threatened

The MacFarlane's four o'clock was originally listed as endangered in 1979. At the time of listing, only three populations were known from the Snake River and Salmon River canyons in Idaho and Oregon. Since 1979, six additional populations of this plant have been discovered in Idaho and Oregon and some populations have been actively monitored by the U.S. Forest Service and the Bureau of Land Management. As a result, the species was downlisted to threatened on March 15, 1996.

The MacFarlane's four o'clock is a long-lived herbaceous perennial with a deep-seated root and bright pink flowers. The species occurs in grassland habitats that are characterized by regionally warm and dry conditions. Sites are dry and generally open, although scattered scrubs may be present. Established plants generally start growth in early April with the timing and duration of flowering apparently linked to precipitation levels. Once established, individual plants may survive for decades.

Threats to the species include livestock grazing, herbicide use, road/trail construction and maintenance, exotic plant species, off-road vehicles, mining, fire suppression and rehabilitation efforts, trampling landslides, flood damage, exotic species and herbicide, and pesticide spraying (FWS, 1997b).

Reissuance of the Stites Wastewater Treatment Plant wastewater discharge permit would not cause an increase in any of the identified threats to the MacFarlane's four-o'clock. Therefore, reissuance of the permit would not have an affect on this species.

Water howellia (*Howellia aquatilis*) - Threatened

Howellia aquatilis (water howellia) was described by Gray in 1879. It is an aquatic plant that grows 10-60 cm tall. Water howellia most frequently occurs in glacial pothole ponds and former river oxbows whose bottom surfaces are firm, consolidated clay and sediments. Water howellia has very narrow ecological requirements, and therefore even subtle changes in its habitat could be devastating to a population. The species does not appear to be capable of colonizing disturbed habitats (Shelly and Moseley, 1988).

The species is threatened by impacts from loss of wetland habitat and habitat changes due to timber harvesting, encroachment by an exotic grass, development, and grazing. Alterations of water quality and the composition of the wetland bottom and vegetation, may affect the viability of *Howellia aquatilis*. Idaho bottom land habitats have been altered by roads, development, conversion to agriculture, and pasture lands. Water howellia may be less able to adapt to environmental changes because of its lack of genetic variability (Lesica et al., 1988).

Reissuance of the Stites Wastewater Treatment Plant wastewater discharge permit would not cause an increase in any of the identified threats to the water howellia. Therefore, reissuance of the permit would not have an affect on this species.

Ute ladies' tresses (*Spiranthes diluvialis*) - Threatened

Ute ladies' tresses is a perennial, terrestrial orchid with three to 15 small white or ivory flowers clustered into a spike arrangement at the top of the stem. This species generally inhabits riverbanks where inundation occurs infrequently (Sheviak 1984). Ute ladies' tresses is endemic to moist soils in mesic or wet meadows near springs, lakes, and perennial streams. The elevation range of known occurrences is 4,000 to 7,000 feet. Generally, this species occurs in areas where the vegetation is relatively open (e.g. grass and forb dominated sites), but some populations are found in riparian woodlands. This orchid is found in several areas of the interior western United States and all known identifications of this plant in Idaho have been along the South Fork Snake River (Idaho Conservation Data Center 2000).

Urban developmmnt and watershed alterations in riparian and wetland habitat adversely affect this plant. It may also be threatened by invasions of exotic plant species such as purple loosestrife, whitetop and reed canarygrass.

Reissuance of the Stites Wastewater Treatment Plant wastewater discharge permit would not cause an increase in any of the identified threats to the Ute ladies'-tresses. Therefore, reissuance of the permit would not have an affect on this species.

References

1. Idaho Department of Fish and Game, 2001. Website at <http://www2.state.id.us/fishgame/>, accessed August, 2001.
2. National Marine Fisheries Service, 1991. NOAA Technical Memorandum NMFS-F/NEC 195. Status Review for Snake River Sockeye Salmon. R.S. Waples and O.W. Johnson. April.
3. National Marine Fisheries Service, 1991. Status Review for Snake River Spring and Summer Chinook Salmon. G.M. Matthews and R.S. Waples.
4. National Marine Fisheries Service. NOAA Technical Memorandum NMFS-NWFSC-27. Status Review of West Coast Steelhead from Washington, Idaho, Oregon, and California.

- P.J. Busby, T.C. Wainwright, G.J. Bryant, L.J. Lierheimer, R.S. Waples, F.W. Waknitz, and I.V. Lagomarsino. Undated.
5. Streamnet, 2001. Website at <http://www.streamnet.org/>, accessed August, 2001.
 6. Baker, J. P., D. P. Bernard, S. W. Christensen, M. J. Sale, J. Freda, K. Heltcher, D. Marmorek, L. Rowe, P. Scanlon, G. Suter, W. Warren-Hicks, and P. Welbourn, 1990. "Biological Effects of Changes in Surface Water Acid-Base Chemistry." NAPAP rpt. 13. In: National Acid Precipitation Assessment Program, Acidic Deposition: State of Science and Technology, Vol. II, cited by Oregon Department of Environmental Quality (1995), Standards & Assessment Section, 1992-1994 Water Quality Standards Review, pH.
 7. Baudo, R., 1983. "Is analytically-defined chemical speciation the answer we need to understand trace element transfer along a trophic chain?" In: Leppard, G. C. (ed) Trace Element Speciation in Surface Waters and its Ecological Implications. Plenum Press, New York, pp. 275-290.
 8. Bell, M. C., 1971. "Water Demands for Enhancement of Fisheries (Food and Growth)." State of Washington Water Research Center.
 9. Bisson, P. A. and R. E. Bilby, 1982. "Avoidance of suspended sediment by juvenile coho salmon." North American Journal of Fisheries Management 2:371-374.
 10. Carson Dorn, Inc., 1999. Biological Monitoring Program Report for the City of Haines, Alaska. November, 1999.
 11. Cetacean Research Unit, 1998. Whale and Dolphin Species Information. Retrieved 13 August 1998 from the World Wide Web: <http://www.Friend.ly.Net/whale/species.htm>
 12. Elder, J.F., and Collins, J.J., 1991. "Freshwater molluscs as indicators of bioavailability and toxicity of metals in surface-water systems." Rev. Environ. Contam. Toxicol. 122:37-79.
 13. European Inland Fisheries Advisory Commission (EIFAC), 1969. "Water Quality Criteria for European Freshwater Fish- Extreme pH Values and Inland Fisheries," as cited in: U.S. Environmental Protection Agency. Quality Criteria for Water- 1986.
 14. Fulton, L.A. 1968. Spawning areas and abundance of chinook salmon, *Oncorhynchus tshawytscha*, in the Columbia River Basin-Past and present. U.S. Fish. Wildl. Serv. Spec. Sci. Rep. Fish. 571:26.
 15. Groot, C. and L. Margolis, 1991. Pacific Salmon Life Histories. Vancouver: UBC Press.
 16. Harrison, R. and M. M. Bryden, 1988. Whales, Dolphins and Porpoises. New York, New York: Facts on File, Inc. 240 pp.
 17. Howell, P., K. Jones, D. Scarnecchia, L. LaVoy, W. Knedra, and D. Orrmann. 1985. Stock assessment of Columbia River anadromous salmonids. Vol: I. U.S. Dep. Energy, Bonneville Power Administration. Project No. 83-335, 558 p.
 18. Hymer, J., R. Pettit, M. Wastel, P. Hahn, and K. Hatch. 1992a. Stock summary reports for Columbia River anadromous salmonids. Volume III: Washington subbasins below

- McNary Dam. Bonneville Power Administration. Project No. 88-108, 1077 p. (Available from Bonneville Power Administration, Division of Fish and Wildlife, Public Information Officer - PJ, P.O. Box 3621, Portland, OR, 97208.)
19. Hymer, J., R. Pettit, M. Wastel, P. Hahn, and K. Hatch. 1992b. Stock summary reports for Columbia River anadromous salmonids. Vol. IV: Washington subbasins above McNary Dam. Bonneville Power Administration. Project No. 88-108, 375 p. (Available from Bonneville Power Administration, Division of Fish and Wildlife, Public Information Officer - PJ, P.O. Box 3621, Portland, OR, 97208.)
 20. Kostow, K. 1995. Biennial Report on the Status of Wild Fish in Oregon. *Oreg. Dep. Fish Wildl. Rep.*, 217 p. + app. (Available from Oregon Department of Fish and Wildlife, P.O. Box 59, Portland, OR 97207.)
 21. Mance, G., 1987. Pollution Threat of Heavy Metals in Aquatic Environments. Elsevier Applied Science. New York, 372 pp.
 22. Mattson, C.R. 1948. Spawning ground studies of Willamette River spring chinook salmon. *Fish Comm. Oreg.* 1(2):21-32.
 23. Mattson, C.R. 1955. Sandy River and its anadromous salmonids. (Available from Oregon Department of Fish and Wildlife, 2501 SW First Avenue, PO Box 59, Portland, OR 97207.)
 24. Mount, D. I., 1973. "Chronic Effect of Low pH on Fathead Minnow Survival, Growth, and Reproduction.," as cited in: U. S. Environmental Protection Agency Quality Criteria for Water- 1986.
 25. National Geographic Films, 1996. Species-Right Whale. A Look at Whales. Retrieved 13 August 1998 from the World Wide Web: <http://www.whalesfilm.com/right.htm>
 26. National Oceanic and Atmospheric Administration. Retrieved August 15, 2001 from the World Wide Web at <http://www.nwr.noaa.gov/1salmon/salmesa/index.htm>.
 27. National Marine Fisheries Service (NMFS), 1984. Sperm Whales. Retrieved 25 November 1998 from the World Wide Web: <http://kingfish.ssp.nmfs.gov/tmcintyr/cetacean/sperm.html>
 28. NMFS. 1996a. Snake River Fall Chinook. Retrieved 10 August 1998 from the World Wide Web: <http://kingfish.ssp.nmfs.gov/tmcintyr/fish/snarfall.html>
 29. NMFS. 1996b. Snake River Spring/Summer Chinook. Retrieved 10 August 1998 from the World Wide Web: <http://kingfish.ssp.nmfs.gov/tmcintyr/fish/snarspr.html>
 30. NMFS. 1996c. Snake River Sockeye. Retrieved 10 August 1998 from the World Wide Web: <http://kingfish.ssp.nmfs.gov/tmcintyr/fish/snarsock.html>
 31. NMFS. 1998. NOAA Technical Memorandum NMFS-NMFSC-35, Status Review of Chinook Salmon from Washington, Idaho, Oregon, and California. J.M. Myers, R.G. Kope, G.J. Bryant, D. Teel, L.J. Lierheimer, T.C. Wainwright, W.S. Grant, F.W. Waknitz, K. Neely, S.T. Lindley, and R.S. Waples.

32. Newcombe, C. P. and J. O. T. Jensen, 1996. "Channel suspended sediment and fisheries; a synthesis for quantitative assessment of risk and impact." *North American Journal of Fisheries Management* 16:693-727.
33. Nicholas, J. 1995. Status of Willamette spring-run chinook salmon relative to Federal Endangered Species Act. Report to the Natl. Mar. Fish. Serv. Oreg. Dep. Wildl., 44 p. (Available from Oregon Department of Fish and Wildlife, 2501 SW First Avenue, PO Box 59, Portland, OR 97207.)
34. Olsen, M.A. 1992. Abundance, age, sex, and size of chinook salmon catches and escapement in Southeast Alaska in 1987. Alaska Dep. Fish Game Tech. Fish. Rep. 92-07, 126 p. (Available from Alaska Department of Fish and Game, Division of Commercial Fisheries, P.O. Box 25526, Juneau, AK 99802-5526.)
35. Olsen, E., P. Pierce, M. McLean, and K. Hatch. 1992. Stock Summary Reports for Columbia River Anadromous Salmonids Volume I: Oregon. U.S. Dep. Energy., Bonneville Power Administration. Project No. 88-108. (Available from Bonneville Power Administration, Division of Fish and Wildlife, Public Information Officer - PJ, P.O. Box 3621, Portland, OR 97208.)
36. Oregon Department of Environmental Quality, 1995. Final Issue Papers 1992 - 1994 Water Quality Standards Review.
37. Orrell, R. 1976. Skagit chinook race differentiation study. NMFS Proj. Rep. 1-98-R, 53 p. (Available from Natl. Mar. Fish. Serv., 2725 Montlake Blvd. E., Seattle, WA 98122.)
38. Reeves, R. R., P. J. Clapham, R. L. Brownell, Jr. and G. K. Silber, 1998a. Recovery Plan for the Blue Whale (*Balaenoptera musculus*). Office of Protected Resources, National Marine Fisheries Service, National Oceanic Atmospheric Administration. Silver Spring, Maryland. Retrieved 24 November 1998 from the World Wide Web: http://kingfish.ssp.nmfs.gov/tmcintyr/PDF_docs/blue_whale.pdf
39. Reeves, R. R., G. K. Silber and P. M. Payne, 1998b. Draft Recovery Plan for the Fin Whale *Balaenoptera physalus* and Sei Whale *Balaenoptera borealis*. Office of Protected Resources, National Marine Fisheries Service, National Oceanic and Atmospheric Administration. Silver Spring, Maryland. Retrieved 24 November 1998 from the World Wide Web: <http://kingfish.ssp.nmfs.gov/tmcintyr/cetacean/finseirec.html>
40. Reimers, P.E., and R.E. Loeffel. 1967. The length of residence of juvenile fall chinook salmon in selected Columbia River tributaries. *Fish Comm. Oreg.* 13, 5-19 p.
41. Servizi, J. A. and D. W. Martens, 1987. "Some effects of suspended Fraser River sediments on sockeye salmon (*Oncorhynchus nerka*)." In: H. D. Smith, L. Margolis, and C. C. Wood editors, Sockeye Salmon (*Oncorhynchus nerka*) Population Biology and Future Management. Canadian Special Publication of Fisheries and Aquatic Sciences 96 pp. 254-264.
42. Servizi, J. A. and D. W. Martens, 1991. "Effect of temperature, season, and fish size on acute lethality of suspended sediments to coho salmon (*Oncorhynchus kisutch*)." *Canadian Journal of Aquatic Sciences* 48:493-497.

43. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, 2001. Correspondence with U.S. EPA Region 10 regarding Reissuance of NPDES wastewater discharge permits for the Cities of Haines, Petersburg, and Sitka, Alaska, February 21, 2001.
44. U.S. Environmental Protection Agency (EPA). 1984. Ambient Water Quality Criteria for Copper 1984. U. S. EPA Report 440/5-84-031.
45. U.S. Environmental Protection Agency (EPA). 1986. Quality Criteria for Water. U. S. EPA Report 440/5-86-001 (Gold Book).
46. U.S. EPA Region 10, 2001. NPDES Permit and Fact Sheet for the City of Sitka, Alaska. Permit Number AK-002147-4.
47. Washington Department of Fisheries (WDF), Washington Department of Wildlife (WDW), and Western Washington Treaty Indian Tribes (WWTIT). 1993. 1992 Washington State salmon and steelhead stock inventory (SASSI). Wash. Dep. Fish Wildl., Olympia, 212 p. + 5 regional volumes. (Available from Washington Department of Fish and Wildlife, 600 Capitol Way N., Olympia, WA 98501-1091.)
48. Waters, T. F., 1995. "Sediment in streams: sources, biological effects, and control." American Fisheries Society Monograph 7.
49. Willis, C.F., S.P. Cramer, D. Cramer, M. Smith, T. Downey, and R. Montagne. 1995. Status of Willamette River spring chinook salmon in regards to the Federal Endangered Species Act. Part 1. Portland General Electric Company and Eugene Water and Electric Board, 74 p. (Available from S.P. Cramer & Associates, Inc. 300 S.E. Arrow Creek Lane, Gesham, OR 97080.)
50. Wren, C. D., MacCrimmon, H. R., and Loescher, B. R., 1983. "Examination of bioaccumulation and biomagnification of metals in a Precambrian shield lake." Water Air Soil Pollution 19:277-291.

APPENDIX D

MAP OF WASTEWATER TREATMENT PLANT LOCATION

THIS PAGE INTENTIONALLY LEFT BLANK. SEE SEPARATE FILE FOR MAP.